

WHAT IS CLAIMED IS:

1        1. A wide-angle lens comprising, from an object side to an image plane side:  
2              a first lens group comprising:  
3                  a first lens having a negative refractive power, and  
4                  a second lens having a positive refractive power; and  
5              a second lens group comprising:  
6                  a third lens having a negative refractive power,  
7                  a fourth lens having a positive refractive power, said fourth lens being bonded to  
8                  said third lens, and  
9                  a fifth lens having a positive refractive power, said fifth lens comprising a first  
10                 convex surface oriented to said object side and a second convex surface oriented to said  
11                 image plane side, at least one of said convex surfaces being an aspherical surface;

12        wherein:

- 13              (1)  $0.7 |R_6| < |R_8| < 1.3 |R_6|$   
14              (2)  $v_1 > v_2, v_3 < v_4, v_5 > 50$   
15              (3)  $|f_1| > 2 f_2$   
16              (4)  $2.5 f_{22} > f_{21} > f_{22}$ ,

17        where  $R_6$  is a curvature radius of an object-side surface of said third lens;

18         $R_8$  is a curvature radius of an image plane-side surface of said fourth lens;

19         $v_i$  is an Abbe number of an  $i$ -th lens ( $i=1 - 5$ );

20         $f_1$  is a composite focal length of said first lens group;

21         $f_2$  is a composite focal length of said second lens group;

22         $f_{21}$  is a composite focal length of said third and said fourth lenses in said second lens

23 group;

24 f22 is a focal length of said fifth lens in said second lens group.

1 2. A wide-angle lens comprising, from an object side to an image plane side:

2 a first lens group comprising:

3 a first lens having a negative refractive power, and

4 a second lens having a positive refractive power; and

5 a second lens group comprising:

6 a third lens having a negative refractive power,

7 a fourth lens having a positive refractive power, said fourth lens being bonded to  
8 said third lens, and

9 a fifth lens having a positive refractive power, said fifth lens comprising a first  
10 convex surface oriented to said object side and a second convex surface oriented to said  
11 image plane side, both of said convex surfaces being aspherical surfaces;

12 wherein:

13 (1)  $0.7 |R_6| < |R_8| < 1.3 |R_6|$

14 (2)  $v_1 > v_2, v_3 < v_4, v_5 > 50$

15 (3)  $f_1 > 4 f_2$

16 (4)  $2.5 f_{22} > f_{21} > f_{22}$ ,

17 where  $R_6$  is a curvature radius of an object-side surface of said third lens;

18  $R_8$  is a curvature radius of an image plane-side surface of said fourth lens;

19  $v_i$  is an Abbe number of an  $i$ -th lens ( $i=1 - 5$ );

20  $f_1$  is a composite focal length of said first lens group;

21  $f_2$  is a composite focal length of said second lens group;

22 f21 is a composite focal length of said third and said fourth lenses in said second lens  
23 group;

24 f22 is a focal length of said fifth lens in said second lens group.

1 3. The wide-angle lens as described in claim 1, further comprising:  
2 a glass filter oriented to said image plane side of said fifth lens.

1 4. The wide-angle lens as described in claim 3; wherein:  
2 (1)  $v_6 > v_5$   
3 where  $v_6$  is an Abbe number of said glass filter.

1 5. The wide-angle lens as described in claim 3, wherein said glass filter is selected from  
2 the group comprising an infrared cut filter and a low-pass filter.

1 6. The wide-angle lens as described in claim 1, further comprising:  
2 an aperture stop disposed between said second lens and said third lens.

1 7. The wide-angle lens as described in claim 1, further comprising:  
2 a total lens length of less than or equal to 12mm.

1 8. The wide-angle lens as described in claim 1, further comprising:  
2 a back focus of greater than or equal to 5mm.

1 9. The wide-angle lens as described in claim 1, further comprising:

2 an exit pupil position of greater than or equal to |20mm|.

1 10. The wide-angle lens as described in claim 7, wherein said total lens length is about  
2 11.10mm to about 11.90mm.

1 11. The wide-angle lens as described in claim 2, further comprising:  
2 a glass filter oriented to said image plane side of said fifth lens.

1 12. The wide-angle lens as described in claim 11; wherein:  
2 (1)  $v_6 > v_5$   
3 where  $v_6$  is an Abbe number of said glass filter.

1 13. The wide-angle lens as described in claim 11, wherein said glass filter is selected from  
2 the group comprising an infrared cut filter and a low-pass filter.

1 14. The wide-angle lens as described in claim 2, further comprising:  
2 an aperture stop disposed between said second lens and said third lens.

1 15. The wide-angle lens as described in claim 2, further comprising:  
2 a total lens length of less than or equal to 10mm.

1 16. The wide-angle lens as described in claim 2, further comprising:  
2 a back focus of greater than or equal to 7mm.

- 1           17. The wide-angle lens as described in claim 2, further comprising:  
2           an exit pupil position of greater than or equal to |20mm|.
- 1           18. The wide-angle lens as described in claim 15, wherein said total lens length is about  
2           9.90mm to about 9.95mm.
- 1           19. A method of producing a wide-angle lens, comprising the following steps:  
2           providing a first lens having a negative refractive power;  
3           providing a second lens having a positive refractive power;  
4           providing a third lens having a negative refractive power;  
5           providing an aperture stop between said second lens and said third lens;  
6           providing a fourth lens having a positive refractive power;  
7           bonding said third lens to said fourth lens;  
8           providing a fifth lens having a positive refractive power and at least one aspherical convex  
9           surface;  
10          providing a glass filter on an image plane side of said fifth lens;  
11          providing  $0.7 |R_6| < |R_8| < 1.3 |R_6|$ ;  
12          providing  $v_1 > v_2, v_3 < v_4, v_5 > 50$ ;  
13          providing  $|f_1| > 2 f_2$ ;  
14          providing  $2.5 f_{22} > f_{21} > f_{22}$ ; and  
15          providing  $v_6 > v_5$ ;  
16          where  $R_6$  is a curvature radius of an object-side surface of said third lens;  
17           $R_8$  is a curvature radius of an image plane-side surface of said fourth lens;  
18           $v_i$  is an Abbe number of an i-th lens ( $i=1 - 5$ );

19        v6 is an Abbe number of said glass filter;  
20        f1 is a composite focal length of said first lens group;  
21        f2 is a composite focal length of said second lens group;  
22        f21 is a composite focal length of said third and said fourth lenses in said second lens  
23        group;  
24        f22 is a focal length of said fifth lens in said second lens group.